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ABSTRACT

The report describes an evaluation of seven affective and cognitive traits of 40 of the 84 students in the Appalachia Educational Laboratory's Employer-Based Career Education (AEL/EBCE) program during the 1972-73 program year as measured by the Student Information System (SIS). All students were tested in February and in May 1973; Group One students (those matriculating in September 1972) had had one semester's exposure to AEL/EBCE before testing, and Group Two students (those matriculating in January 1973) had had none. In the February test, Group One students appeared to have superior psychomotor creativity and superior maturity but were inferior in learning attitude to Group Two students. In the May test, the difference in psychomotor creativity between the two groups was less and was not statistically significant. The difference between the groups in learning attitude, maturity, cognitive skills, personal adjustment, social adjustment, and flexibility remained approximately the same. Given these findings, the traits that were measured by the Student Information System questionnaire appear not to have been affected by the EBCE program. (Author/JR)

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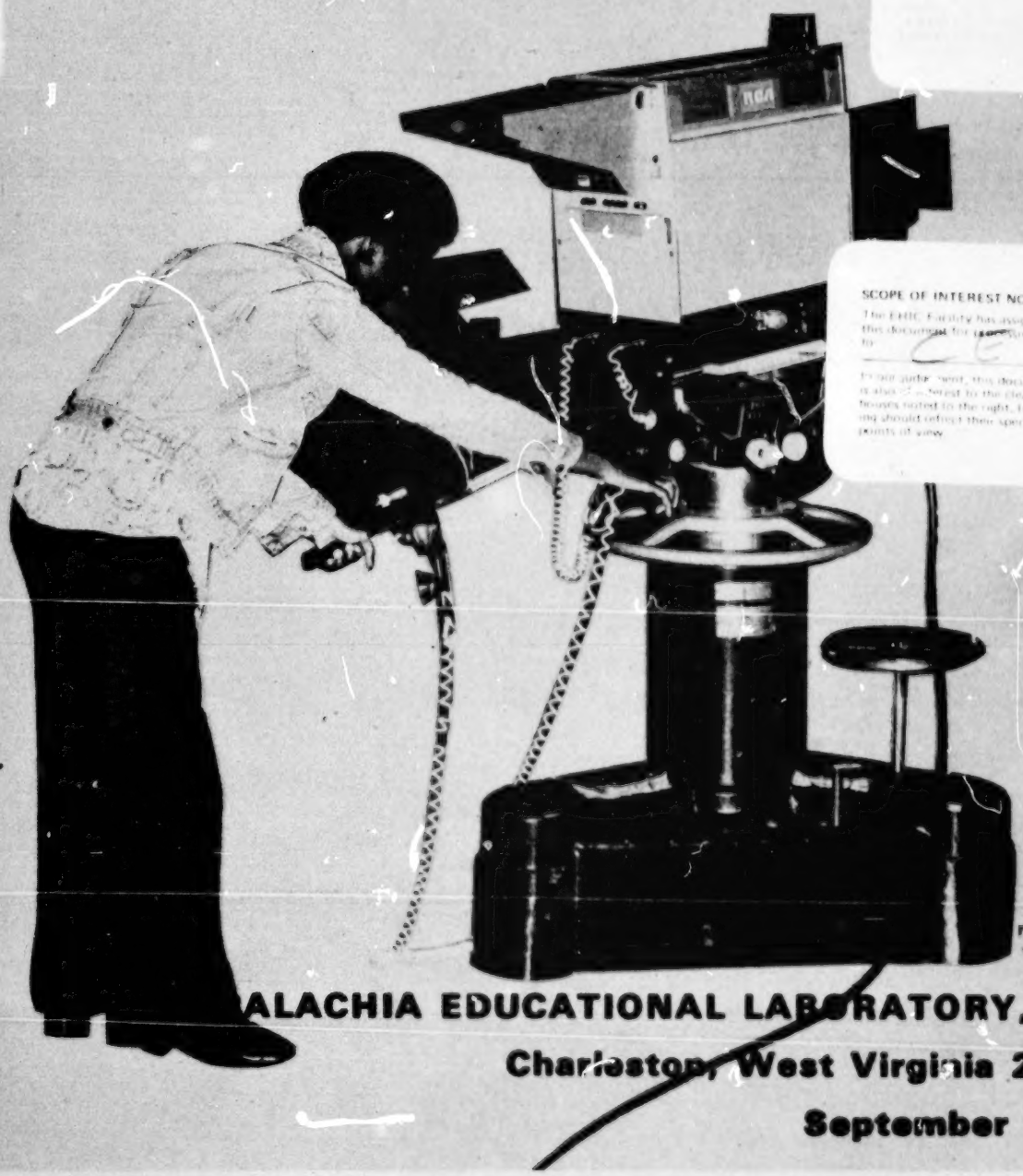
Analysis of Data from the Student Information System



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September 1973

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Cover picture: Sam Burge, an EBCE student learns the fundamentals of operating a television camera at WMUL-TV in Nitro, West Virginia

Employer-Based Career Education

Analysis of Data from the Student Information System

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TECHNICAL REPORT NO. 41

RESEARCH AND EVALUATION DIVISION
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Preface

The following report is one of a series resulting from the evaluation of the Employer-Based Career Education (EBCE) program between September, 1972, and June, 1973. The focus of this report is the affective and cognitive development of students who volunteered for the program. The data on which the report is based were derived through administration of the Student Information System, which is a standardized instrument designed to measure cognitive skills, learning attitudes, and certain personal adjustment characteristics.

The data were analyzed and the report was written by Dr. James T. Ranson of the West Virginia College of Graduate Studies, under contract to the Appalachia Educational Laboratory, Inc. The EBCE evaluation was conducted and supervised by Dr. James R. Sanders, Evaluation Specialist with the Laboratory and under the general direction of Dr. Charles L. Bertram, Director of Research and Evaluation for the Laboratory. The report was critically reviewed by Dr. John Hildebrand, Associate Educational Development Specialist with the EBCE program staff.

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Introduction

The purpose of this study was to evaluate certain affective and cognitive traits of pupils who participated in the Employer-Based Career Education (EBCE) program at the Appalachia Educational Laboratory, Inc. during the 1972-73 school year. This study was in response to a need for the program developers of EBCE to have information which might indicate a relationship between the use of the EBCE program and the affective and cognitive growth of the pupils participating in the program.

Two different groups of students completed the EBCE program during the 1972-73 academic year. The groups differed mainly in the length of time that each participated in the program. One group of 21 students, hereafter called Group I, participated from September, 1972, to May, 1973, and a second group (Group II) participated from January, 1973, to May, 1973. The first group of students was in the program for one full academic year, and the second group received the program only during the second half of the year. A control group of students which did not receive the EBCE program at any time was not available during the first year of testing.

The groups were made up of high school seniors from the Kanawha County school system. The participants volunteered; so this fact should be considered when inferences are made concerning any larger population.

The school system from which the participants came is considered to be fairly progressive. The facilities are generally quite new, and the programming is also considered by many professional educators to be quite innovative. Although no available hard data support the conclusion, many have concluded that the participants in the EBCE program were exposed to a good school system before they participated in the EBCE program.

Design

As previously indicated, two groups of pupils were the sources of data for this evaluation. Each of the two groups were assumed to be a random sample from the population of senior high students in the Kanawha County school system who would volunteer for an EBCE program. Figure 1 diagrams the time frame of the participation in the program. Given the time frame when the two groups were observed or measured, the following questions seem relevant:

1. How did Group I students compare with the norm at O_1 (February) and O_2 (May)?
2. Was there any change in Group I means between O_1 (February) and O_2 (May)?
3. How did Group II compare with the norm at O_3 (Winter) and O_4 (Spring)?
4. Was there any change in the new group between O_3 (Winter) and O_4 (Spring)?
5. Did the two groups differ from each other at the O_1 (Winter) and O_3 (Winter) testing, or at O_2 (Spring) and O_4 (Spring) testing?

Treatment	Autumn* September 1972	Winter Testing February 1973	Spring Testing May 1973
Group I	EBCE	O_1	EBCE O_2
Group II	No exposure	O_3	EBCE O_4

*The SIS was not administered as a pretest to Group I.

Figure 1

Diagram of the Time Frame for Exposure of the Groups and Testing of the Students in the EBCE Program

The Measure

The instrument used for this evaluation was a questionnaire which is called a "Student Information System". The primary purpose of this instrument is to provide data to:

a. Help determine each student's individual learning and program needs

b. Provide....descriptions of these needs

c. Provide....aid in....program planning....

d. Provide baseline information to evaluate attainment of learning and program objective

e. Provide evaluation data on the effects of any program or project[1]

Twenty-one different scales which are supposed to facilitate a better understanding of interests, attitudes, and pupil's plans have been identified by the authors of the test. Seven of these scales which were most relevant to EBCE program objectives were selected for data analysis and reporting.

The seven selected scales are:

1. Cognitive skills. This is a measure of basic learning aptitudes. General comprehension, reading, speaking, and general learning skills are included in this scale.
2. Learning attitudes. Attitudes toward the learning skills of concentration, organization, dependability, and willingness.
3. Psychomotor creativity. This scale measures originality and the ability to express creativity in a physical manner.
4. Personal adjustment. Orderliness, pleasantness, happiness, and good judgment are measured by this scale.

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[1]Behavioral Consultants. Manual of Student Information System (SIS). (Salt Lake City: Behavioral Consultants, 1971), p. 2.

5. Maturity. This scale measures the ability to refrain from yelling at others, fighting, losing temper, and tattling.
6. Social adjustment. Confidence, leadership, concern for others, and being well-liked is measured by this scale.
7. Flexibility. The variables of this scale are need for praise, sensitive, stubborn, easily offended, and unpredictable.

The reliability for the "Student Information System" (SIS) is quite adequate having a test-retest correlation of .85 which, as far as psychometrics are concerned, is within an acceptable margin of accuracy.[2]

The assumption was made that the "SIS scores" could be subjected validly to parametric statistical techniques. "SIS scores" are scores which have been derived from raw scores but can be analyzed with normal techniques.

Statistical Model

Complete data were obtained from 20 students in Group I and 20 students in Group II for a total of 40 students. Each of the seven scales were analyzed seperately. Testing periods and groups were controlled using an analysis of variance statistical model for each analysis. The t-test and studentized range tests (q)[3] were also employed. Analysis of variance tables are attached as the appendix to this report.

Results

The first question was, "How did Group I compare with the norm at the Winter and Spring testing?"

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[2]Ibid., p. 22.

[3]B. J. Winer, Statistical Principles in Experimental Design, McGraw-Hill Book Company, New York, 1962, p. 77-85.

The norm for each of the seven SIS scales is 50. The means for Group I on the scales of cognitive skills, learning attitudes, psychomotor creativity, personal adjustment, maturity, social adjustment, and flexibility at the Winter testing were 49.1, 42.45, 55.00, 28.45, 26.25, 29.50, and 42.2 respectively. The means for Group I on these seven SIS scales at the Spring testing were 45.7, 43.35, 52.8, 29.7, 28.15, 30.00, and 42.1 respectively.

Group I was significantly above the norm of 50 on the psychomotor creativity scale at both the Winter and Spring testing periods; the group was equal to the norm on cognitive skills at the Winter testing period and below the norm at the Spring testing period; and Group I was below the norm on the remainder of the scales at both the Winter and Spring testing. Table 1 presents the results, and Figure 2 graphically illustrates the comparisons.

Table 1

Comparison of the Group I Means to the Norms at the Winter and Spring Testing*

	Winter			Spring		
	$\bar{X}$	t	P	$\bar{X}$	t	P
Cognitive skills	49.10	-0.427	NS	45.70	-2.041	.05
Learning attitudes	42.45	-2.820	.01	43.35	-2.484	.01
Psychomotor creativity	55.00	2.403	.025	52.80	1.346	.100
Personal adjustment	28.45	-12.827	.001	29.70	-12.083	001
Maturity	26.25	-10.575	.001	28.15	-9.729	.001
Social adjustment	29.50	-10.163	.001	30.00	-9.915	.001
Flexibility	42.20	-3.548	.001	42.10	-3.594	.001

*The SIS Norm is 50 for each scale.

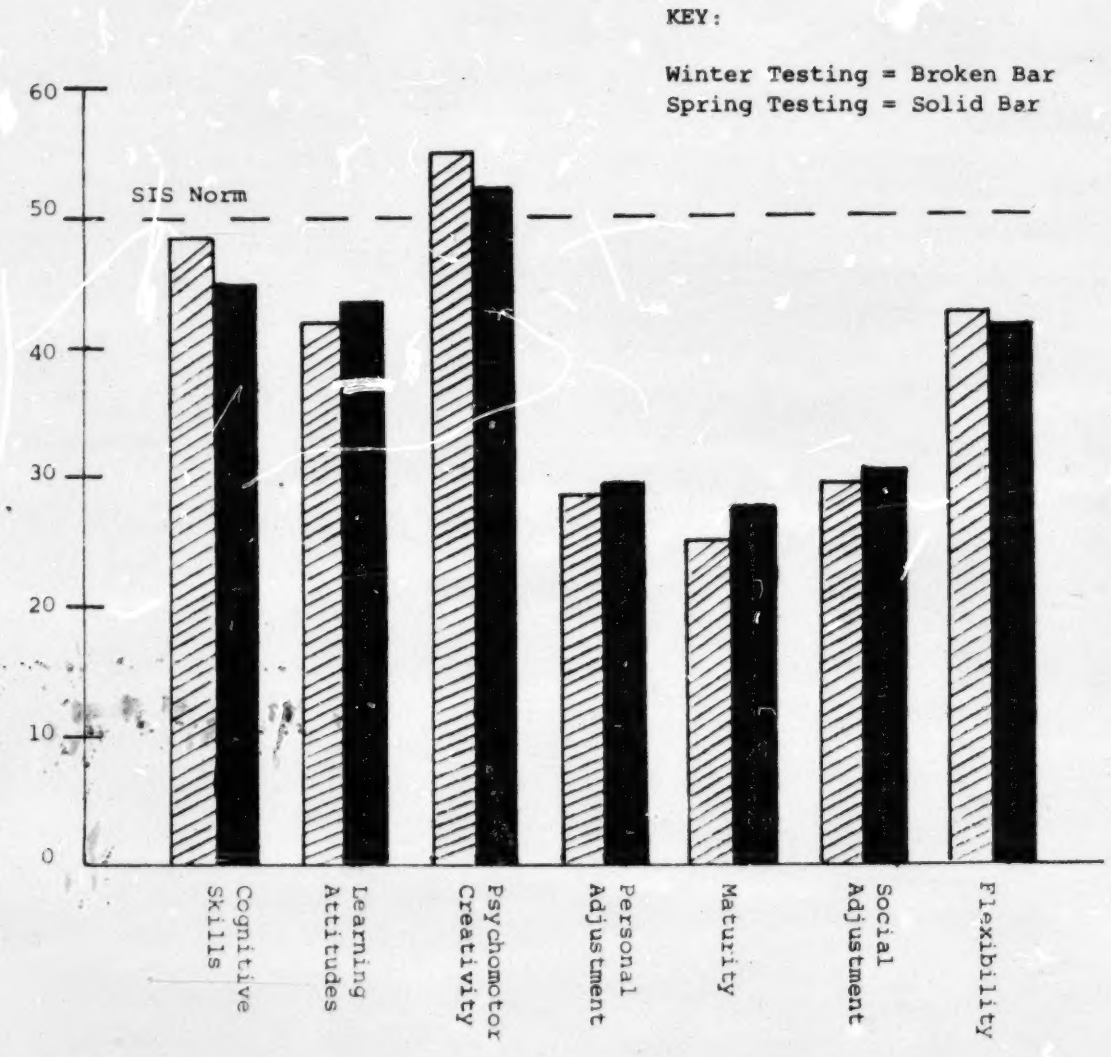

Figure 2

Graphic Illustration of Group I Winter and Spring Means Compared with the SIS Norms

The second question was, "Did any change occur in Group I means between the Winter and Spring testing?"

In the overall analysis, any change would have been manifested in a group by testing period interaction. No group by testing period interaction appeared as statistically significant. However, differences required for significance at the .05 level using the "q" statistic are reported.

The mean differences for each of the seven scales between the Winter and Spring testing were (1) cognitive skills, 3.40, (2) learning attitudes, -.90, (3) psychomotor creativity, 2.20, (4) personal adjustment, -1.25, (5) maturity, -1.90, (6) social adjustment, -0.50, and (7) flexibility, 0.10. None of these mean differences were statistically significant at the .05 level. Table 2 presents the mean scores for the seven scales at the Winter and Spring testing, the differences between the means and the differences required for statistical significance at the .05 level.

Table 2

Comparison of the Group I Winter and Spring Means for Each SIS Scale

	Winter	Spring	Difference	Required Difference*	P
Cognitive skills	49.10	45.70	-3.40	7.86	NS
Learning attitudes	42.45	43.35	0.90	9.24	NS
Psychomotor creativity	55.00	52.80	-2.20	7.89	NS
Personal adjustment	28.45	29.70	1.25	6.07	NS
Maturity	26.25	28.15	1.90	7.91	NS
Social adjustment	29.50	30.00	0.50	7.02	NS
Flexibility	42.20	42.10	0.10	8.09	NS

*Value required to satisfy .05 level of significance

The data suggest that Group I remained unchanged between the two testing periods.

Question three was, "How did Group II compare with the norm at the Winter and Spring testing periods?"

Group II participated in the EBCE program from February through May of the first program year. The mean scores for each of the seven SIS scales for Group II at the Winter testing were (1) cognitive skills, 45.60, (2) learning attitudes, 51.1, (3) psychomotor creativity, 49.6, (4) personal adjustment, 25.4, (5) maturity, 16.95, (6) social adjustment, 28.7, and (7) flexibility, 39.3. For the same seven scales respectively the mean scores for the Spring testing were 43.80, 52.50, 49.85, 29.35, 20.35, 28.20, and 41.50.

On none of the seven subtests was Group II above the norm; the new group was at the norm on learning attitude and psychomotor creativity at both the Winter and Spring testing periods; and Group II was below the norm on the remaining five scales at both the Winter and Spring testing. Figure 3 presents the results for this analysis, and the differences are graphically depicted in Figure 3.

Table 3

Comparison of Group II Means to the SIS Norms at the Winter and Spring Testing

	Winter			Spring		
	$\bar{X}$	t	P	$\bar{X}$	t	P
Cognitive skills	45.60	-2.088	.05	43.80	-2.942	.004
Learning attitudes	51.10	-0.415	NS	52.50	0.944	NS
Psychomotor creativity	49.60	-0.192	NS	49.85	-0.072	NS
Personal adjustment	25.40	-14.643	.001	29.35	-12.291	.001
Maturity	16.95	-14.716	.001	20.35	-13.202	.001
Social adjustment	28.70	-10.560	.001	28.20	-10.807	.001
Flexibility	29.30	-4.867	.001	41.50	-3.866	.001

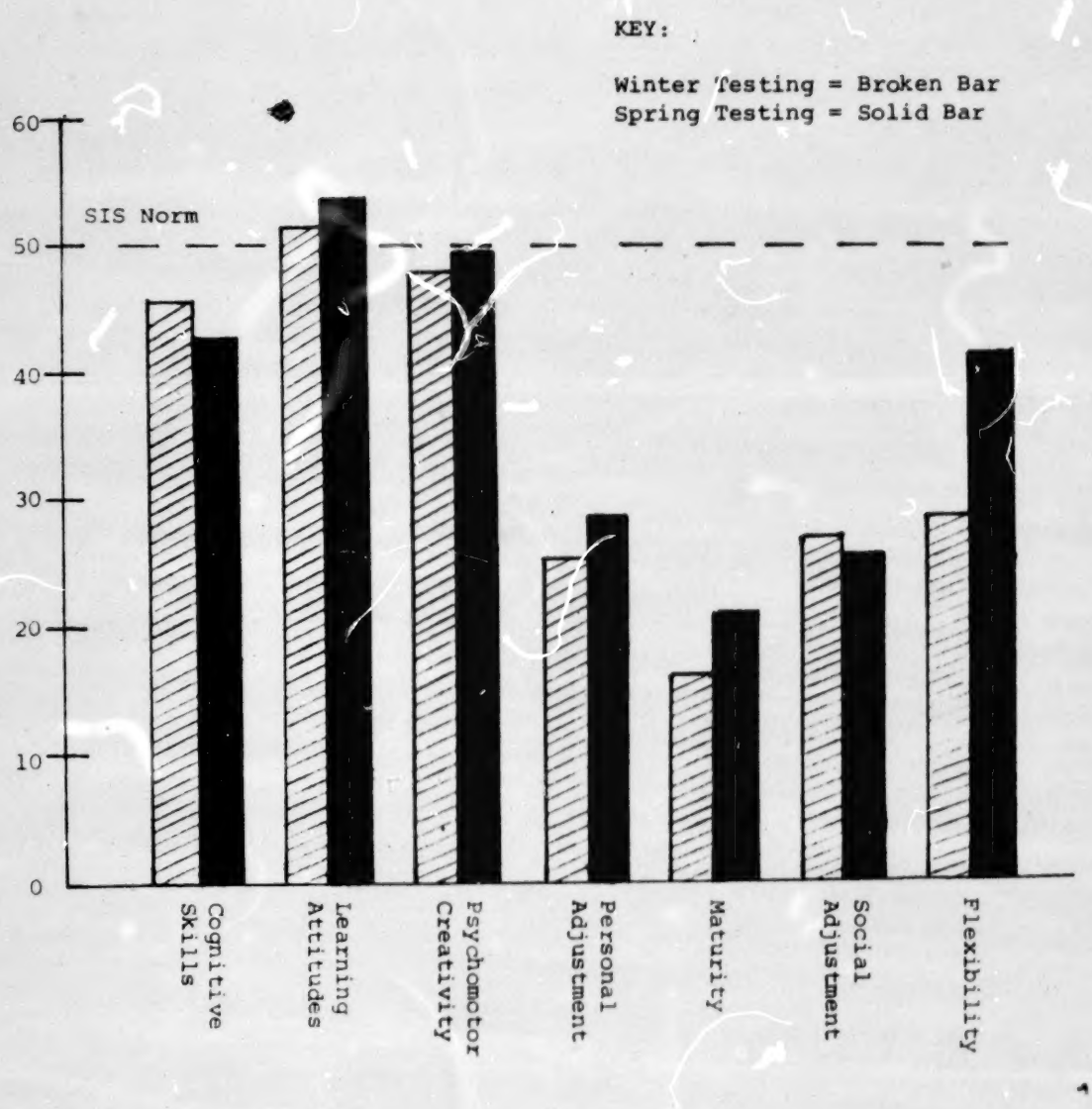

Figure 3

Graphic Illustration of Group II Winter and Spring Means Compared with the SIS Norms

Question four was, "Did any change occur in Group II between the Winter and Spring testing periods?"

As indicated in an earlier section any significant change that was peculiar to this group between the Winter and Spring testing periods would have been manifested in a group by testing period interaction. No statistically significant interaction on any of the seven scales appeared. However, differences between the means and differences required for statistical significance at .05 level using the "q" statistic were computed and are presented in Table 4.

Table 4

Comparison of Testing Period Means for Group II

	Winter	Spring	Difference	Required Difference*	P
Cognitive skills	45.60	43.80	1.80	7.86	NS
Learning attitudes	51.10	52.50	-1.40	9.24	NS
Psychomotor creativity	49.60	49.85	0.25	7.89	NS
Personal adjustment	25.40	29.35	3.95	6.07	NS
Maturity	16.95	20.35	3.40	7.91	NS
Social adjustment	28.70	28.20	-0.50	7.02	NS
Flexibility	39.30	41.50	2.20	8.09	NS

*Value required to satisfy .05 level of significance for the studentized range "q" statistic

Question five was, "Did the two groups differ at the Winter or Spring testing?"

At the Winter testing period, Group II was higher than Group I on learning attitude ($p < .013$); Group I was higher than Group II on psychomotor creativity

($p < .064$) and maturity ($p < .006$) and the two groups were equal on the remaining four scales.

At the Spring testing period, Group II was higher ($p < .020$) than Group I on learning attitude; Group I was higher ($p < .020$) than the new group on maturity.

Consistent with the results presented earlier, the two groups remained about the same across both testing periods. The one exception was on the psychomotor creativity scale, on which the group which was in the EBCE program all year excelled the newer group at the Winter testing but not at the Spring testing. Table 5 presents the results of the analysis.

Summary and Discussion

The objective of this study was to evalute certain affective and cognitive traits of high school seniors who participated in the EBCE program at Appalachia Educational Laboratory during the 1972-73 academic school year. The evaluation can be summarized by examining the stability of the groups over the entire school year.

Group I had been exposed to the program for one semester before they were tested. Group II started at the beginning of the second semester. At that time--the Winter testing period--Group I appeared to have superior psychomotor creativity and superior maturity, but were inferior in learning attitude. At the Spring testing, the difference in psychomotor creativity was less and the difference was not statistically significant; the difference between the old and new group on learning attitude, maturity, cognitive skills, personal adjustment, social adjustment, and flexibility remained approximately the same. Given these findings, the traits that were measured by the "Student Information System" questionnaire appear not to have been affected by the Employer-Based Career Education program.

Table 5

Comparison of Mean Scores by Group and Testing Period

	Group I Means	Group II Means	Difference	F	P
		Winter Testing			
Cognitive skills	49.10	45.60	3.50	1.416	NS
Learning attitude	42.45	51.10	8.65	6.688	.01
Psychomotor creativity	55.00	49.60	5.40	3.548	.06
Personal adjustment	28.45	25.40	3.05	2.148	NS
Maturity	26.25	16.95	9.30	13.840	.001
Social adjustment	29.50	28.70	0.80	.0841	NS
Flexibility	49.20	39.30	2.90	0.666	NS
		Spring Testing			
Cognitive skills	45.70	43.80	1.90	0.400	NS
Learning attitude	43.35	52.50	9.15	5.825	.02
Psychomotor creativity	52.80	49.85	2.95	0.996	NS
Personal adjustment	29.70	29.35	0.35	0.018	NS
Maturity	28.15	20.35	7.80	5.807	.02
Social adjustment	30.00	28.20	1.80	0.352	NS
Flexibility	42.10	41.50	0.60	0.050	NS

The comparison with national norms seems to indicate that the students were initially deficient in learning attitude, personal adjustment, maturity, social adjustment and flexibility, and adequate in psychomotor creativity and cognitive skills. Assuming this conclusion is valid, then quite clearly any programming in terms of objectives, content and procedures would probably be more successful if the apparent psychological and sociological needs were reflected strongly in the EBCE program. For example, the students are deficient in maturity and personal adjustment. Given this as a fact, what can be done with a program so that a participant comes out a more mature person and a better personally adjusted person? How can the strength of psychomotor creativity be related to the weaknesses of maturity, personal adjustment, and social adjustment to provide a more self-actualized participant?

The data generated in this study have provided a picture of the first-year participants, and probably more importantly, a picture of a larger population of Kanawha County, West Virginia, students. Given this picture, the programming goals possibly can now more adequately reflect a direction which is consistent with educational needs and population reality.

Appendix

Table A1

Significance of Difference between Group I and Group II Winter Scores on the SIS Cognitive Skills Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	122.50	122.50	1.42	NS
Subjects	38	3288.60	86.54		
Corrected total	39	3411.10	87.46		

Table A2

Significance of Difference between Group I and Group II Winter Scores on the SIS Learning Attitudes Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	748.23	748.23	6.69	0.01
Subjects	38	4250.75	111.86		
Corrected total	39	4998.98	128.18		

Table A3

Significance of Difference between Group I and Group II Winter Scores on the SIS Psychomotor Creativity Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	291.60	291.60	3.55	0.06
Subjects	38	3122.80	82.18		
Corrected total	39	3414.40	87.55		

Table A4

Significance of Difference between Group I and Group II Winter Scores on the Personal Adjustment Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	93.03	93.03	2.15	NS
Subjects	38	1645.75	43.31		
Corrected total	39	1738.78	44.58		

Table A5

Significance of Difference between Group I and Group II Winter Scores on the SIS Maturity Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	864.90	864.90	13.84	.001
Subjects	38	2374.70	62.49		
Corrected total	39	3239.60	83.07		

Table A6

Significance of Difference between Group I and Group II Winter Scores on the SIS Social Adjustment Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	6.40	6.40	0.08	NS
Subjects	38	2891.20	76.08		
Corrected total	39	2897.60	74.30		

Table A7

Significance of Difference between Group I and Group II Winter Scores on the SIS Flexability Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	84.10	84.10	0.67	NS
Subjects	38	4799.40	126.30		
Corrected total	39	4883.50	125.22		

Table A8

Significance of Difference between Group I and Group II Spring Scores on the SIS Cognitive Skills Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	36.10	36.10	0.40	NS
Subjects	38	3433.40	90.35		
Corrected total	39	3469.50	88.96		

Table A9

Significance of Difference between Group I and Group II Spring Scores on the SIS Learning Attitudes Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	837.23	837.23	5.83	0.02
Subjects	38	5461.55	143.73		
Corrected total	39	6298.78	161.51		

Table A10

Significance of Difference between Group I and Group II Spring Scores on the SIS Psychomotor Creativity Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	87.03	87.03	0.99	NS
Subjects	38	3321.75	87.41		
Corrected total	39	3408.78	87.40		

Table A11

Significance of Difference between Group I and Group II Spring Scores on the Personal Adjustment Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	1.23	1.23	0.02	NS
Subjects	38	2584.75	68.02		
Corrected total	39	2585.98	66.31		

Table A12

Significance of Difference between Group I and Group II Spring Scores on the SIS Maturity Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	608.40	608.40	5.81	0.02
Subjects	38	3981.10	104.77		
Corrected total	39	4589.50	117.68		

Table A13

Significance of Difference between Group I and Group II Spring Scores on the SIS Social Adjustment Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	32.40	32.40	0.35	NS
Subjects	38	3499.20	92.08		
Corrected total	39	3531.60	90.55		

Table A14

Significance of Difference between Group I and Group II Spring Scores on the SIS Flexability Scale according to One-Way Analysis of Variance

Source	DF	SS	MS	F	P
Group	1	3.60	3.60	0.05	NS
Subjects	38	2726.80	71.76		
Corrected total	39	2730.40	70.01		

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